

The Role of Functional Integration in Corporate Information Management

REVIEW DRAFT FOR STAFF COMMENTS, 5 January 1992

Office of the Director of Defense Information

The Role of Functional Integration in Corporate Information Management

DRAFT OF PRESENTATION
Information Policy Council

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ASDCIC, Director of Defense Information (USP) - P&T-142-11

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Driver of DoD CIM: Small Forces Deployment

- The needs of small, mobile, rapidly deployed and locally managed forces shall be the core of CIM Requirements.
- The objective of Functional Management is to guide the delivery of CIM Requirements with less resources.

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The Fundamental CIM Building Blocks

- The CIM systems shall evolve from function-centric, theater-centric and service-centric orientations towards systems that support Joint Task Forces.
- U.S. military forces must be able to "fight on arrival".
- Everything that is not deployable will be supported from centrally managed shared resources.

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Design Requirements for Deployable CIM Systems

- Standard, vendor-independent, modular, scalable, inter-operable, flexible, secure, survivable, portable, redundant, damage-resistant, low-cost, long-life, commercial, adaptable, plug-together elements.
- The elements are easy to test, use, train on and require minimum staff for design, deployment, operation and maintenance.

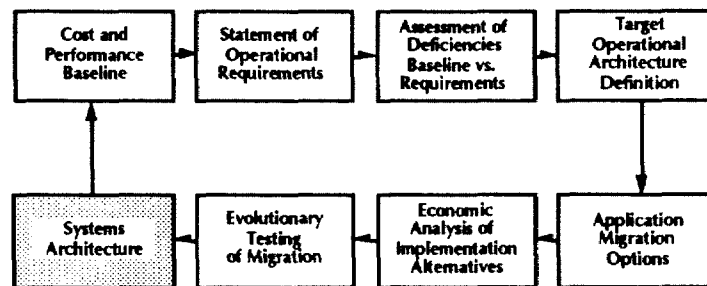
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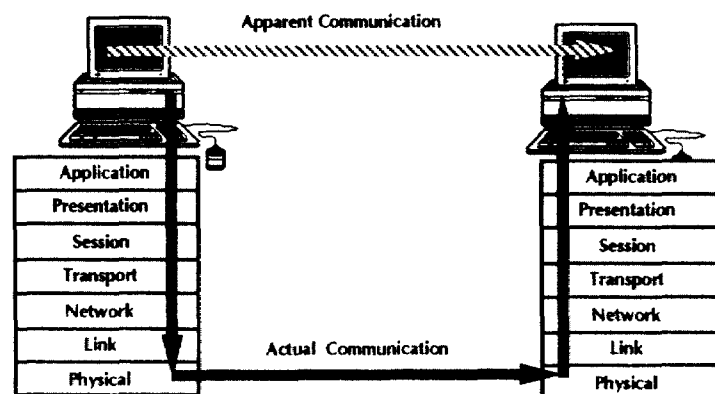
How to Acquire a Systems Architecture



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The "Open Systems" Layered Technical Architecture



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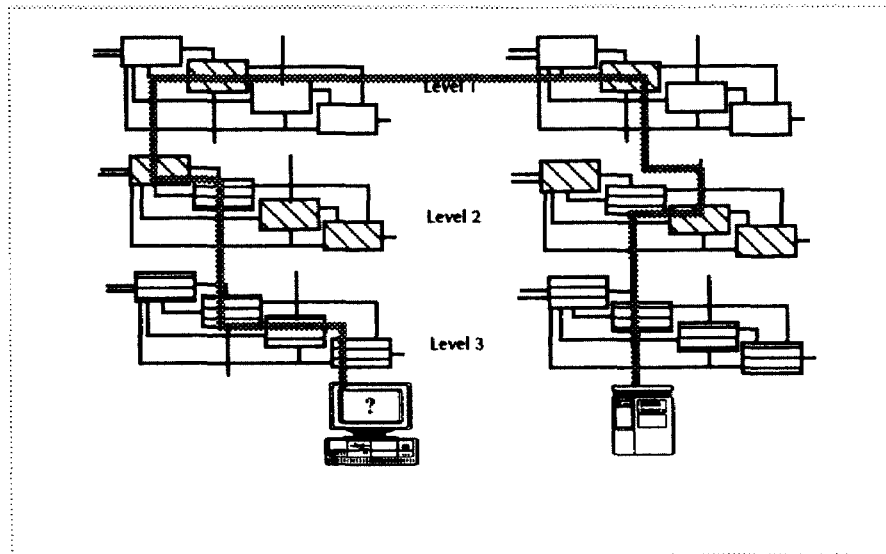
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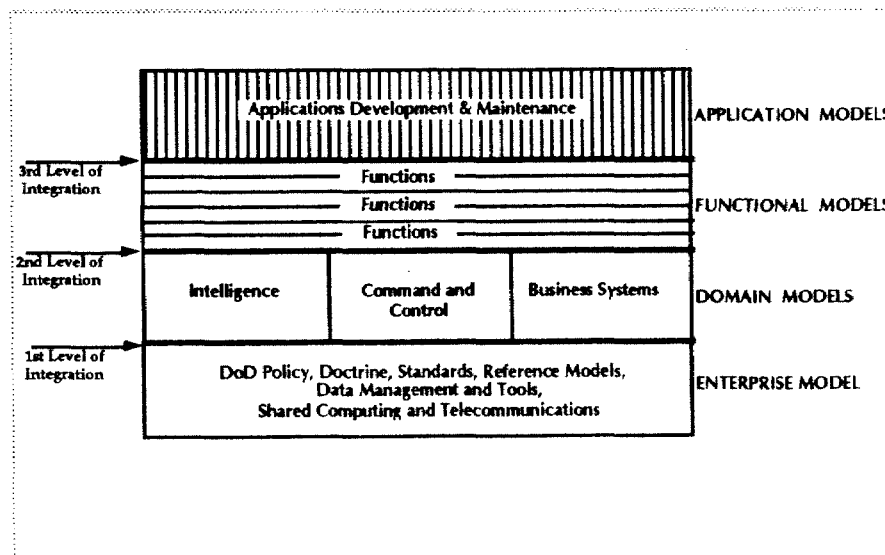
The CIM Layered Functional Architecture



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Required Levels of Integration in DoD



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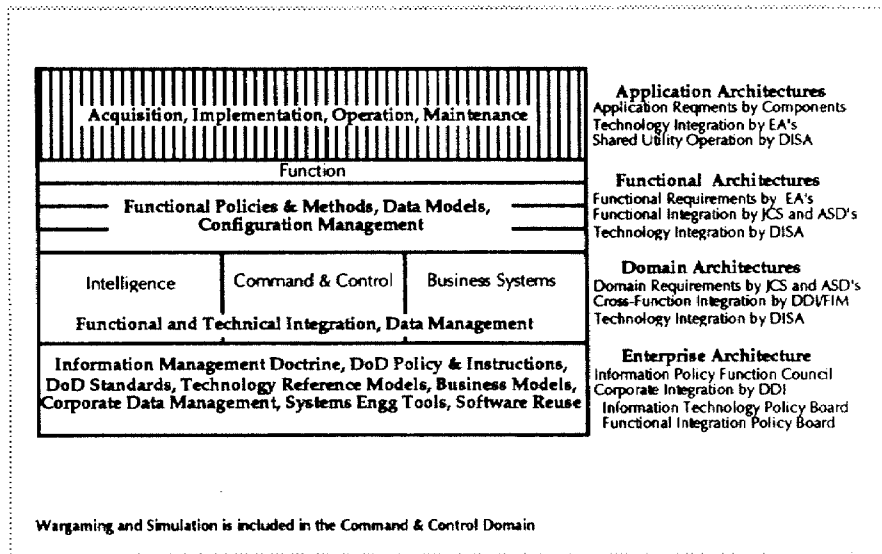
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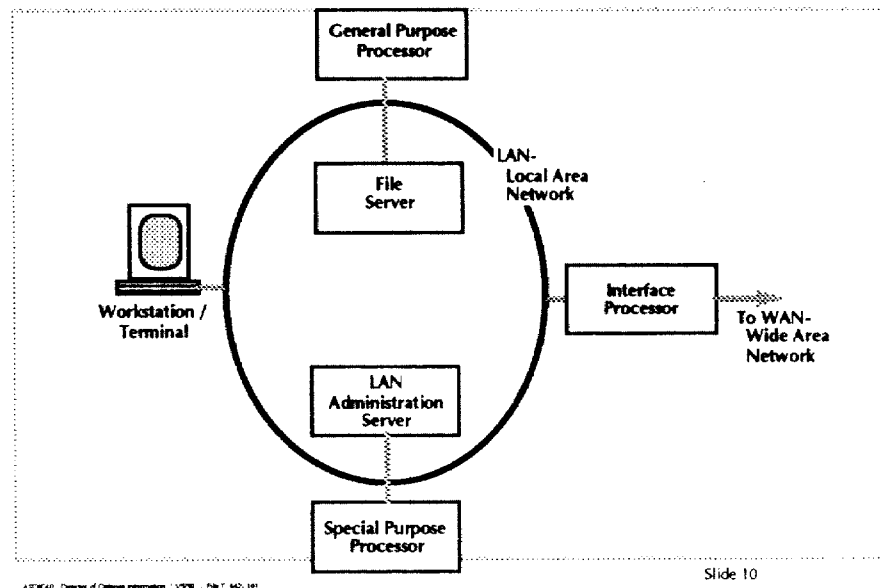
The Organization of CIM Architectures



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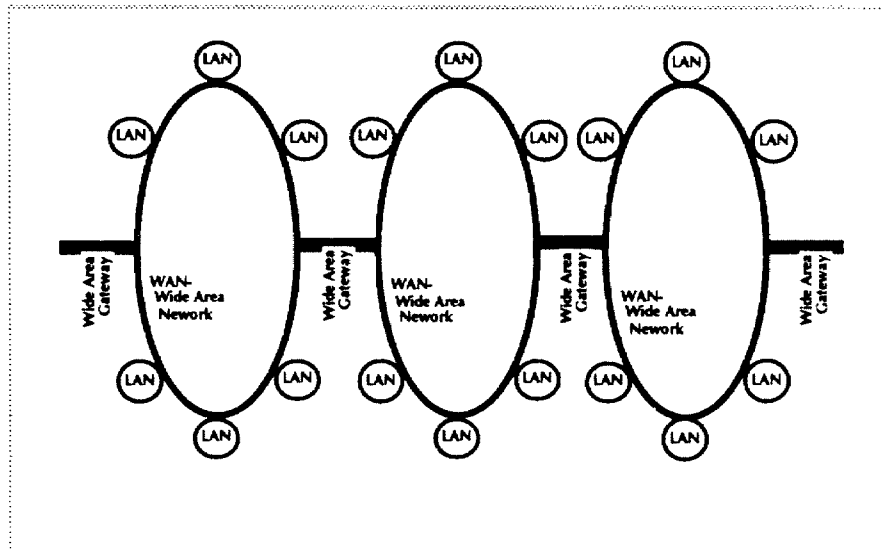
LAN: The Fundamental Information Architecture Building Block



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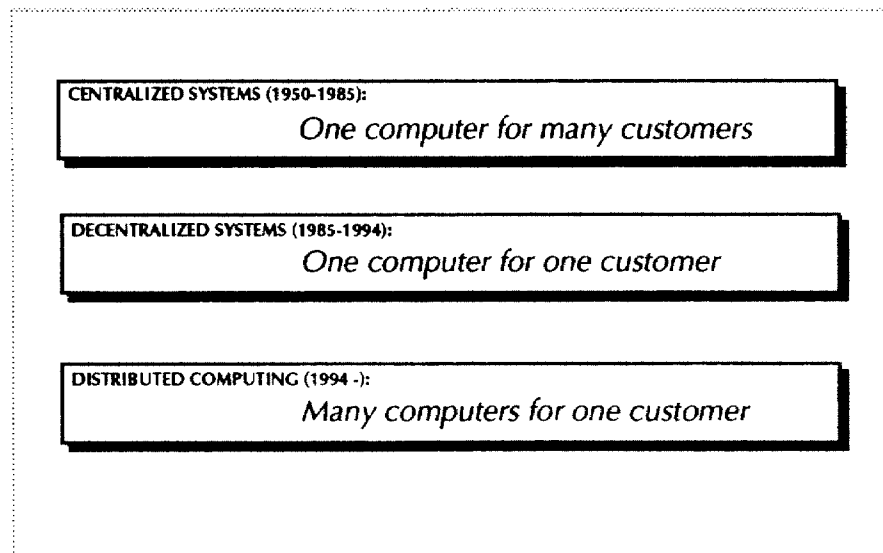
WAN: The Fundamental Communications Architecture



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The Paradigm Shifts in DoD Information Technologies



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The Paradigm Shifts in DoD Information Technology Acquisition

CENTRALIZED SYSTEMS (1950-1985):

One acquisition for each Program

DECENTRALIZED SYSTEMS (1985-1994):

Several acquisitions for each Function

DISTRIBUTED COMPUTING (1994 -):

Common acquisition, as a Utility

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Changing Systems Management Roles

- The role of OSD is to add value, to manage cross-Domain and cross-Functional integration.
- The purpose of Enterprise and Domain integration is to accelerate systems deployment.
- The objective is to deliver customized local choices constructed from standard elements.
- Where local choice is economically infeasible, deliver network support.

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DoD Information Management Doctrine - Management

- Derive information management strategies directly from war plans
- Establish technical systems integration capabilities as a core Defense capability
- Replace current over-emphasis on technology acquisition by planning for total functional life-cycle costs
- Apply business re-engineering as a continuous, incremental and evolutionary productivity-enhancement process
- Charge the functional customer for information technology based on activity-based costing
- Benchmark transaction costs against commercial services

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DoD Information Management Doctrine - Resources

- Evaluate functional costs, not information technology
- Reserve for DoD the capability to fully support its Enterprise, Domain and Functional requirements and integration needs
- Rely on commercial sources for delivery information all technologies except for those expressly reserved
- Justify applications on the basis of discounted cash flow analysis
- Justify shared computing and telecommunications resources on the basis of revenue from transactions

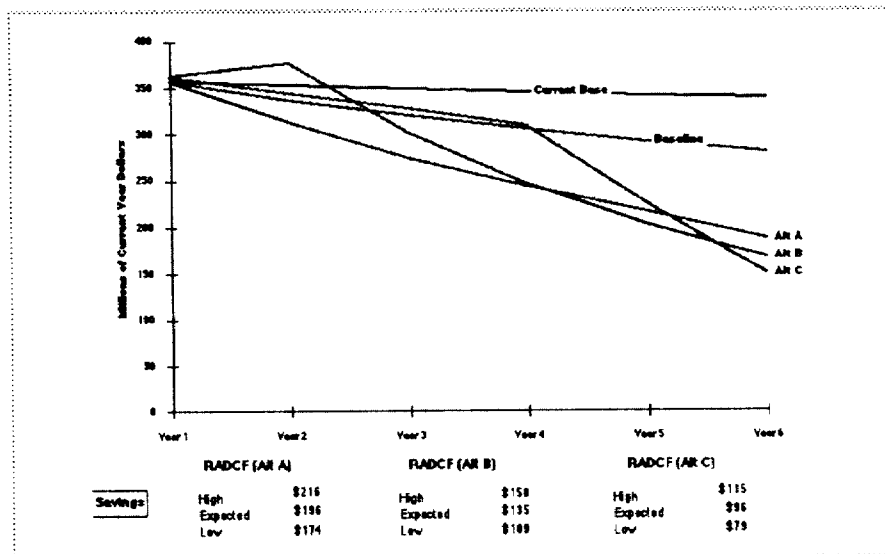
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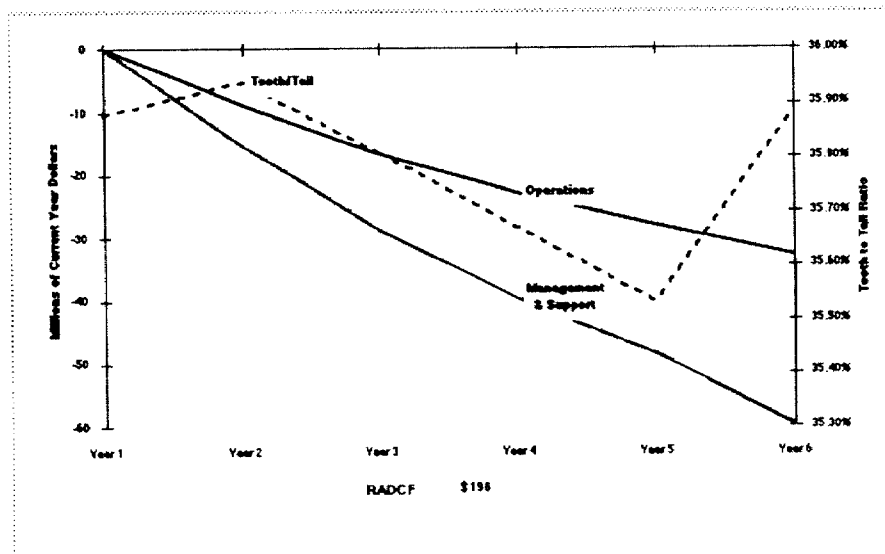
Functional Economic Analysis - Three Risk-Adjusted Cash Flows



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Cash Savings for Alternative A, including Tooth/Tail Ratio



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DoD Information Management Doctrine - Design

- Pursue evolutionary and incremental systems deployment
- Design by prototype within a generally defined strategy
- Train as you fight and design (prototype) as you train
- Give customers capacity for complex inquiries
- Transfer report-generation responsibilities to customers
- Allow for rapid re-configuration of design functions
- Have business process redesign precede systems design
- Construct variety from software elements and not hardware
- Always separate software into data management, applications, reporting and output standard components

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DoD Information Management Doctrine - Network

- Treat communication networks designs as inseparable from computer systems
- View the computer network as an extended workstation
- Recognize the inherent vulnerability of all networks in war and therefore place computing capacity at point of use
- Integrate data, voice, graphics and video into a shared network
- Establish central management of all communication networks
- Provide, as a central service, value-added communications functions such as directory, security, information interchange and software distribution services

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DoD Information Management Doctrine - Security

- Expect that information systems are choice war targets
- Validate each systems design for war-scenario survivability
- Evaluate survivability in terms of insurance economics
- Achieve survivability primarily through redundancy
- Support critical data bases from low-risk sites
- Escalate the enforcement of information security
- Subject network to hostile tests to identify exposures
- Control access to network entry points, especially for software management and maintenance
- Design security into hardware configurations
- Maintain central monitoring over mission-critical terminals

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DoD Information Management Doctrine - Data

- Mandate single-point entry of data
- Require DoD certification of all data definitions
- Set immutable enterprise-wide data definitions
- Assure single source data origination stewardship
- Use data base stewardship to set functional boundaries
- Issue data definitions as Government Furnished Material
- Dictate the maintenance of data models for all applications
- Centralize database backup and archival functions
- Store and distribute images in standard compressed format
- Pursue electronic data interchange agreements with other agencies, suppliers and contractors

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DoD Information Management Doctrine - Technology

- Use off-the-shelf hardware and software
- Lengthen technology life by continuous upgrading
- Distribute hardware and software from re-use "warehouses"
- Require single workstation for individual information needs
- Establish standardization of display interface style
- Commit to vendor-independent inter-operable systems
- Pursue a distributed client/server architecture
- Provide scalable computing capacity using microprocessors

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DoD Information Management Doctrine - Standards

- Design systems according to the DoD Reference Models
- Follow industry standards, FIPS standards if industry standards not available and MIL standards only if necessary
- Define, store and distribute software objects
- Adopt a software development toolset
- Define a process and data modeling
- Specify a method for economic analysis of systems

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Technology Integration with Individually Defined Interfaces

The Component Integration Equation where each Component must individually integrate with every other Component:

$$\text{Number of Integration Actions} = (n-1) + (n-2) + \dots + (n-(n-1))$$

where n=number of components

Examples:

2 components = 1 integration
3 components = 3 integrations
4 components = 6 integrations
5 components = 10 integrations
6 components = 15 integrations
7 components = 21 integrations

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Technology Integration with Standard Interfaces

The Component Integration Equation where each Component must individually integrate with every other Component:

$$\text{Number of Integration Actions} = (n-1)$$

where n=number of components

Examples:

2 components = 1 integration
3 components = 2 integrations
4 components = 3 integrations
5 components = 4 integrations
6 components = 5 integrations
7 components = 6 integrations

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What are the CIM roles of DISA?

#1 Priority:

Performing Level 1 and 2 Technology Integration

#2 Priority:

Delivering Enterprise and Domain services.

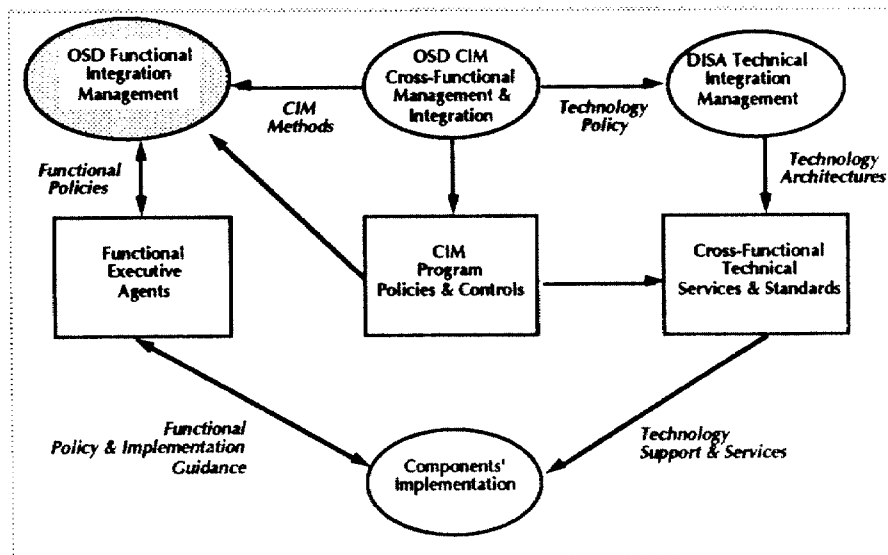
#3 Priority:

Managing the DoD information "Utility" Function, e.g. operating cross-functional and cross-Component shared computing and telecommunications services.

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Functional and Technical Organization for CIM



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Selected DoD CIM Principles

- Fight on Arrival
- Cut Tail, not Teeth
- Information Systems are The Target
- Pull, not Push Information
- There is Only One Data Definition
- Design as you Train
- Trade Steel for Silicon
- Do Not Automate the Irrelevant
- Integration is the Essential Capability
- Computers are Only Network Terminals

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